AMENDMENTS TO THE CLAIMS

This listing will replace all prior versions, and listings, of claims in the application:

1. (Currently amended) A method for detecting unbalanced conditions of a rotating load driven by a synchronous electric motor ~~(3)~~ in washing machines ~~(1)~~ and similar household appliances including a ~~rotably~~ rotatable drum ~~(2)~~ and wherein at least a transient step is provided with angular speed (w) variation of the ~~rotably~~ rotatable drum ~~(2)~~, ~~characterised by~~ the method comprising the following steps:

constantly monitoring and detecting the instantaneous current (Iq) absorbed by the motor;

calculating in real time the value of an unbalanced mass (m) on the basis of the variation (Δ) of said current (Iq) and starting from a predetermined reference obtained by experimental results and by applying a calculation formula representative of the kind of load imbalance;

checking that said value of unbalanced mass is lower than a predetermined acceptable reference value ($\Delta(Iq_I)_{AMM}$) and slowing down the angular speed (w) of said drum in case of negative result;

said current (Iq) driving as a feedback signal said motor ~~(3)~~ according to said value of unbalanced mass (m) adjusting the angular revolution speed of the motor in real or continuous time,

wherein an imbalance signal is computed as a difference between the last sampled value of the current signal (Iq), in the time instant wherein the absolute value of the first derivate of said current signal (Iq) is less than a predetermined threshold and the second derivate of the same signal Iq is positive, and the last sampled value of said current signal (Iq) in the time instant wherein the absolute value of the first derivate of said current signal (Iq) is less than a predetermined threshold and the second derivate of the same signal Iq is negative.

2. (Currently Amended) The method according to claim 1, ~~characterised in that it~~ wherein the method provides a comparison between the standard deviation (σ) of said current (Iq) with a predetermined reference stored in a memory unit including for example an average value of this current (Iq) or a predetermined threshold value.

3. (Cancelled)

4. (Currently Amended) A method for detecting unbalanced conditions of a rotating load driven by a synchronous electric motor in washing machines and similar household appliances including a rotatable drum and wherein at least a transient step is provided with angular speed (w) variation of the rotatable drum, the method comprising the following steps:

constantly monitoring and detecting the instantaneous current (Iq) absorbed by the motor;

calculating in real time the value of an unbalanced mass (m) on the basis of the variation (Δ) of said current (Iq) and starting from a predetermined reference obtained by experimental results and by applying a calculation formula representative of the kind of load imbalance;

checking that said value of unbalanced mass is lower than a predetermined acceptable reference value ($\Delta(Iq_1)_{AMM}$) and slowing down the angular speed (w) of said drum in case of negative result;

said current (Iq) driving as a feedback signal said motor according to said value of unbalanced mass (m) adjusting the angular revolution speed of the motor in real or continuous time,

~~Method according to claim 1, characterised in that~~ wherein the measure of said unbalanced mass (m) occurs at first by measuring said current (Iq) variation (Δ) with a low number of drum revolutions comprising between 60 and 80 revolutions per minute.

5. (Cancelled)

6. (Currently Amended) Method according to claim 4, ~~characterised in that it provides~~ further comprising a step for controlling that the measured variation ($\Delta(Iq_1)$) at a said low number of drum revolutions is lower than a predetermined acceptable reference value ($\Delta(Iq_1)_{AMM}$) and ~~a subsequent order of~~ subsequently slowing down the drum rotation speed (w) if this check gives a negative result.

7. (Currently Amended) Method according to claim 4, ~~characterised in that it provides~~ further comprising a step for controlling that the measured variation ($\Delta(Iq_1)$) at ~~a~~ said low number of drum revolutions is lower than a predetermined acceptable reference value ($\Delta(Iq_1)_{AMM}$) and ~~a subsequent order of~~ subsequently gradually increasing the drum revolving speed (w) if the control gives a positive result.

8. (Currently Amended) Method according to claim 7, ~~characterised in that~~ wherein the gradual speed increase continues until about 150 revolutions per minute are reached.

9. (Currently Amended) Method according to claim 7, ~~characterised in that it provides~~ further comprising a step of further controlling that the measured variation ($\Delta(Iq_2)$) at increased number of revolutions is lower than a second predetermined acceptable reference value ($\Delta(Iq_2)_{AMM}$).

10. (Currently Amended) Method according to claim 9, ~~characterised in that it provides~~ further comprising a centrifugal step at reduced rotation speed if said further control gives a negative result.

11. (Currently Amended) Method according to claim 9, ~~characterised in that it provides that~~ further comprising a centrifugal step is started if said further control gives a positive result.

12. (Currently Amended) Method according to claim 9, ~~characterised in that it provides~~ further comprising a slow down, without stop, of the drum ~~(2)~~ rotation speed in order to cause a new load distribution if said further control gives a positive result.

13. (Currently Amended) Method according to claim 10, ~~characterised in that it provides~~ further comprising a steady monitoring of said measured variation ($\Delta(Iq_2)$) in the centrifugal step at reduced speed.

14. (Currently amended) A method for detecting unbalanced conditions of a rotating load driven by a synchronous electric motor in washing machines and similar household appliances including a rotatable drum and wherein at least a transient step is provided with angular speed (w) variation of the rotatable drum, the method comprising the following steps:

constantly monitoring and detecting the instantaneous current (Iq) absorbed by the motor;

calculating in real time the value of an unbalanced mass (m) on the basis of the variation (Δ) of said current (Iq) and starting from a predetermined reference obtained by experimental results and by applying a calculation formula representative of the kind of load imbalance;

checking that said value of unbalanced mass is lower than a predetermined acceptable reference value ($\Delta(Iq_I)_{AMM}$) and slowing down the angular speed (w) of said drum in case of negative result;

said current (Iq) driving as a feedback signal said motor according to said value of unbalanced mass (m) adjusting the angular revolution speed of the motor in real or continuous time,

wherein a comparison between the standard deviation (σ) of said current (Iq) with a predetermined reference is stored in a memory unit including for example an average value of this current (Iq) or a predetermined threshold value, and

~~Method according to claim 2, characterised in that~~ wherein the comparison between the variation (Δ) and said current (Iq) occurs both in static unbalanced conditions and in dynamic unbalanced conditions.

15. (Currently Amended) Method according to claim 14, ~~characterised in that~~ wherein the one variation operator is the standard deviation operator (σ) and is drawn, for a dynamic imbalance, from the following relation:

$$\sigma\,(Iq)_{dynamic} = m * K2 * w^{\alpha} + Ko$$

Where: Ko, K2 and α are known constant experimentally-determined values, w is the rotation speed and m is said unbalanced mass.